



CENTER LINE

A Publication of Waukesha County's Retzer Nature Center

Winter 2010

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- ♦ Ephemeral Spring

Upcoming Events:

- ♦ Winter Wildlife on Showshoes some Saturdays in January & February
- ♦ JanBoree January 23
- ♦ Wild Winter Night February 5
- ♦ Aldo Leopold Weekend March 5

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A CONDITION OF WEATHER-WHETHER YOU LIKE IT OR NOT

Whether you like it or not, if you live in an area where snow rarely frequents the ground, you can still see snow—by watching the sky, and observing the cirrus clouds, for cirrus clouds are made up of ice crystals. Like it or not, if you live in Wisconsin and weather our winters, you can see snow cover the ground frequently, and calculate where you can pile up a bigger snow mound, while hanging out with the snow shovel. In Wisconsin, solid precipitation maintenance has become a seasonal sport. Open to all, the young, middle-aged, over-the-hill members—an open invitation. All that's needed for the games—a warm uniform and a workable snow shovel.

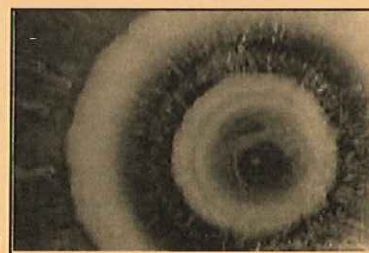
Solid precipitation, like snow, for instance, has a crystalline nature; the snow will assume many intricate formations. Typical forms, with their graphic symbols (see Illustration to the right), are: Plates, Stellars, Columns, Needles, Spatial Dendrites, (dendrites means tree-like), Capped Columns, and Irregular Crystals. The many forms of snow reflect the temperature and moisture conditions in the super cooled clouds where these particles form. Density of freshly fallen snow is about 1/10 that of liquid water.

Not to be outdone in Wisconsin's seasonal sport, is the activity of Graupel. Graupel consists primarily of a bunch of frozen cloud droplets. If the initial particle is a cluster of ice needles, the Graupel tends to be of a conical nature. If the first particle is an aggregation of cloud droplets, the Graupel appears lumpy and somewhat spherical. Graupel is sometimes called soft hail. When a Graupel hits an object, it often flattens out into a rounded spot of powdery snow, with no visual crystalline structure. Graupel sometimes forms in strong updrafts of cold air and makes an appearance in blizzards and snowstorms, occurring downwind of a lake. Graupel is often seen in severe lightning storms, and its particles can be highly electrified. Solid precipitation with a kick!

Sleet is another formidable structure to be reckoned with in wild winter games. Sleet will rattle on the windowpanes during a freezing rain. Particles sometimes have an interesting structure. As drizzling rain falls into cold air, it freezes from the outside inward. Right before the drop is completely frozen, the interior water expands with great force, cracks the ice sphere, and flows to the surface. There it freezes in the form of a tiny ice needle. Partly frozen droplets may break open when they hit ground. These drops leave small cuplike fragments. At times, drops may combine with ice crystals or transform them into lumpy, transparent ice fragments. In the removal of sleet from car windows during winter games, unsportsmen-like language can be used throughout this seasonal sport.

Another form of solid precipitation, included in Wisconsin's winter games, and a form that can score havoc with its keen edge, is damaging hail. All hail will break loose in the seasonal sport of solid precipitation maintenance. Damage control is

	Plates
	Stellars
	Columns
	Needles
	Spatial Dendrites
	Capped Columns
	Irregular Crystals
	Graupel
	Sleet
	Damaging Hail

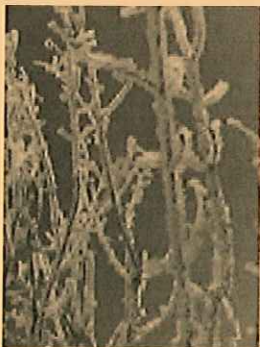


Cross Section of Hail

difficult and often costly. Hailstones begin in the gut of large cumulonimbus clouds, and grow from pea to grapefruit in size, within a small area of intense updraft. This area in the cumulonimbus cloud is called the accumulation zone. Within the zone, the hail's increasing weight is balanced by an ever increasing upward air speed. Sometimes the hailstone can start falling, and meet a new and more intense updraft, that may carry it higher into the cloud. An updraft could even toss it up and over the top, so that it falls to earth through clear air. Happenstance could even cause the hailstone to fall through the cloud as an updraft weakens, so that the stone would gather droplets and ice crystals until it leaves its origin. Larger crystals grow during this period as the hailstone partially melts, and then refreezes, over, and over again, until its size will multiply, growing from bead to baseball. When the large ball is finally tossed into the fray, by nature, it is completely out of control. From the playing field, the ump called out, and he was.

Although snow formations number 1-7 are beautiful in their modeling, and offer satisfaction, wandering over them on skis or snowshoes, maybe sledding, even when exerting high energy in solid precipitation maintenance. Numbers 8, 9, and 10, in the formations of winter games must be respected. Graupel, sleet, and hail compete in games called blizzards, electrical snowstorms and ice storms. That can be dangerous and damaging to life and limb. In the damaging category, hail is the medalist.

All types of solid precipitation are unique and strikingly beautiful when photographed. However, the hailstone, the most dangerous type, would again win the trophy. A thin section of stone, two inches wide, was photographed using two crossed polarizing filters. The photo showed that the hailstone consists of crystalline bits ranging in size from 10 to 2000 microns. The units represented periods of wet and dry growth. In cross section, a large hailstone looks like an onion with transparent and translucent layers. The crystals printed were in shades of blue, green, and yellow. Hints of red blended in the edges. The opaque view is caused by tiny trapped air bubbles. The hailstone looked fragile and had a kaleidoscopic quality about it. Nature's artwork was other-worldly and difficult to explain.



Mention has to be made of two artful players in the winter games, Rime and Hoar frost. Both work their magic in higher elevations. When super cold clouds sweep over high summits, they volley droplets that will freeze on contact with exposed objects. This activity produces the play of Rime, and an ice sculpture

of Rime will grow into the wind. The formation could be grainy, if the drops freeze instantly, or smooth if the water drops chance to flow before solidification. Hoar frost, the artist in residence, is the opaque granular deposit of ice that forms when the super cold cloud droplets freeze rapidly, after hitting any exposed objects, such as a branch for example. The stronger the wind and the larger the

droplets, the more beautiful the artwork. Rime and Hoar frost work their magic in all high elevation games.

Whether you like it or not, before the winter games come to a close, there is another team that needs to be brought into the limelight. They are almost forgotten because they never reach the playing fields. Benched before arriving, the group is Virga. Virga is falling precipitation, usually frozen, that evaporates before reaching the ground. Look up into the storm clouds to see Virga. The team with no maintenance to pick up after. Thank the heavens for the reprieve!

During Wisconsin's colder months, whether you like it or not, with the passing of years, participating in winter sports becomes impeded. Even a game of solid precipitation maintenance no longer can be carried off. Like Virga, getting into the games is impossible. Handing down the snow shovel, to a better performer can be logged in the rule book. At times money will also cross palms during serious ceremonies. The alternative solution to the hiatus following is found in an example from the bear. You lead a hibernial existence. Find a warm hangout, snuggle with the TV weathercasters, root for the underdogs in all the winter games, and periodically poke your nose outside. Enjoy the beautiful sculpturing of a cold winter landscape.

Whether you like it or not, eventually spring will come out to play, and I also will—

See you on the trail,

Shirley Blanchard

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Personal observation by the author.

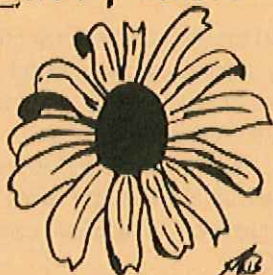


A Sincere Thanks to...

The following individuals or groups have donated to Retzer Nature Center since the last issue of CENTER LINE. Their support is greatly appreciated.

- Cash donation from SUM-MER DEL Garden Club

The Last Prairie



EPHEMERAL SPRING

I know that it is winter right now. Hopefully, this will help keep you warm until things thaw out again (and until the author understands the difference between a solstice and an equinox). Spring is short, or at least it seems that way to some of us. No offense to winter, but by the time March rolls around, Wisconsin residents are ready to see a little green. Right around the vernal equinox, plants start popping out of the ground like Prairie Dogs with a case of cabin fever. Everything is fresh, new and growing fast. You try to keep up with all the awakenings and happenings, but it's just not possible. You stop trying to figure it all out, and resign yourself to enjoying springtime in general. You are just easing into it when it seems to be getting warmer, and wasn't that a mosquito? Before you know it, June 21st is here, and along with it, summer. Where did spring go? More to the point, where did the spring ephemerals go?

Ephemeral can refer to many things. From the Greek and Latin origins of the word, the literal meaning is 'on the day' or 'lasting but a day'. In general, it means a very short period of time; a fleeting existence. When used as a noun with 'spring' preceding it, early-blooming plants with delicate foliage come to mind. In ecology, spring ephemeral means a plant that emerges from the ground before most other species, and turns dormant (usually) by early summer. This is the botanical version of 'early bird gets the worm'. These tough-as-nails little plants grow in the early cold of late March. Those of you who tend gardens know this is way before the safe planting date of Mother's Day. These short-lived individuals weather their share of frost, proving their stems, leaves, and flowers only appear delicate.

The advantage to freezing their buds off is only the main source of life-giving energy known to this planet. The great majority of ephemerals in our region grow in wooded areas. Their strategy is to soak up all the sunlight they can before the mighty trees all around them leaf out. Even after the upper canopy diffuses the light from the Sun, they have such a jump start on the 'late bloomers' that they get all they need before other plants overgrow them. This all seems logical, well, and good, but of

course, there is more to it than that. Since they have a short window to do what most plants do in an entire season, absolutely everything about these plants is geared toward the utmost efficiency through their entire, brief life cycle.

Let's begin with the Sun. Compared to most plants, ephemerals have a very high photosynthetic rate (Lapointe 2001). First, their leaves are usually not waxy or reflective, absorbing as much light as possible. Second, they have a higher chlorophyll ratio than summer-green herbs, along with a better-developed spongy **mesophyll** (the photosynthetic tissue of a leaf or other organ). This means more cells to turn sunshine and nutrients into food (Gilliam and Roberts 2003).

Third, developing fruits themselves may contribute to stored energy (yes, this is unusual indeed). *Adonis racemosa*, an Asian ephemeral in the Buttercup family, has its ripening fruits contribute up to



one third of the resources for seed production (Horibata et. al. 2007). Fourth, the plants have very high levels of enzymes specific to photosynthetic carbon reduction (producing food). To maintain these high levels, plants must keep a large amount of Nitrogen and other nutrients supplied to the leaves and fruits (Gilliam and Roberts 2003). This is one of the reasons that most spring ephemerals are restricted to Nitrogen-rich, forest soils (Lapointe 2001).

So, they seem to be in sync with the Sun, but they must still deal with lower temperatures. In general, there is lower enzyme activity, translocation, carbon uptake, and—let's face it—all plant activity is reduced at lower temperatures. Cold temperatures make everything as slow as molasses. Flora sprouting in March and April cannot afford to wait for things to warm up, so they have developed mechanisms and physiology to deal with the cool of spring. They have lower *stoma* (small openings in leaf surfaces for gas exchange) densities than most sun plants, but very efficient gas exchange, especially at night. This may be due to larger diameter stomata and/or a more efficient exchange system. The lower number of openings may also help the leaf to retain heat (Sawada et. al. 2002). Like some biennials and winter annuals, they possess natural antifreeze agents to get them through the colder nights. The sugars they produce for food also help protect against freezing. Growing so close to the ground doesn't hurt either. The earth helps buffer colder temperatures and warms quickly with sunshine, allowing ephemerals to take advantage of the radiant heat (Gilliam and Roberts 2003).

Even with adaptations, cold is still a limiting factor, slowing metabolism, growth, and pollinators. A cold spring followed by a rapid warm-up can significantly reduce seed output.

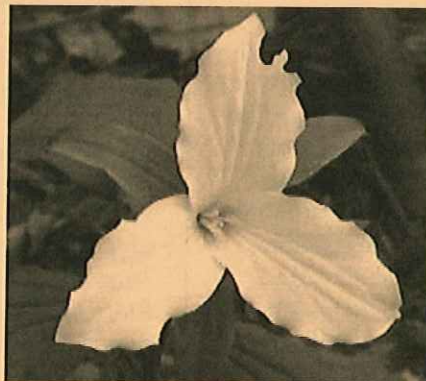
By the time things warm up, trees are unfurling leaves, birds are moving through, and the rest of the forest floor wakes. It is high time for ephemerals to exit stage-left. Hopefully, all the necessary solar collecting, seed-setting, and growing is done. The same leaves that helped produce all that food early on, are now a liability to sustain. They simply require too much energy with the reduced sunlight and increased spatial competition. Most ephemerals **senesce** (to reach maturity, or grow old; in botany regarding perennials, the plant enters dormancy and the above-ground portion dies back) soon after leaf-out. Some argue this is because that is when the roots have sufficient reserves, but a recent study suggests it is due to the extra shade and competition. The plant can become an energy sink, drawing more food than it creates (Gutjahr and Lapointe 2008).

There is one (well, maybe two) more final adaptation to help these individuals fill this niche. During senescence, the plants are very good at recapturing the energy contained in their aerial biomass (stems, petioles, and leaves), and storing it in their root systems for next year (Gilliam and Roberts 2003). At least one species in our area uses some of these reserves for autumn root development. Yellow Trout Lily (*Erythronium americanum*) initiates root growth early in the fall and continues into the cold season. This may mean that springtime growth focuses development above ground, and only after reproduction is secured, does that focus shift to the roots (Gutjahr and Lapointe 2008).

Ok, that is enough science for now. You may be curious what early bloomers grow in our area (if you aren't, you should be). You have a decent chance of seeing the following, if you can find a good quality woods.



Claytonia virginica
(Spring Beauty)



Trillium grandiflorum
(White /Large-flowered Trillium/Wake Robin)



Dicentra cucullaria
(Dutchman's Breeches)

Spring ephemerals:

- ♦ *Dodecatheon meadia* (Shooting Star)
- ♦ *Erythronium americanum* (Yellow Trout Lilly)
- ♦ *Floerkea proserpinacoides* (False Mermaid)
- ♦ *Isopyrum biternatum* (False Rue Anemone)
- ♦ *Jeffersonia diphylla* (Twinleaf)
- ♦ *Sanguinaria canadensis* (Bloodroot)
- ♦ *Thalictrum thalictroides* (Rue Anemone)
- ♦ *Trillium flexipes* (Gleason's Trillium/Wake Robin)
- ♦ *Trillium recurvatum* (Prairie Trillium/Wake Robin)

Some of these are a little sketchy. The Trilliums, Jack in the Pulpit, and Twinleaf definitely hang around after the forest canopy develops above them. All of them do senesce a little early. There are two other notables. Shooting Star is found in prairies and savannas, and False Mermaid is an annual. Spring ephemerals are extremely rare in both of these situations. All early risers are intriguing, but those two deserve a special nod. I hope all of you get a chance to nod at them yourself this year. Spring seems a long way from now, but winter is also fleeting. Until the time is right, enjoy the cold. Before you know it, the woods will shed its white blanket for green.

Mike

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Friends of Retzer Nature Center

The Friends of Retzer Nature Center is a registered, 501 (c)3, organization dedicated to encouraging, perpetuating, and promoting the work of conservation and natural resource education.

Please become a member of the Friends of Retzer Nature Center. Your membership will help support numerous projects that make Retzer an even better place for families and school children. We are working with Waukesha

County Parks on the following projects: rebuilding the teaching pond; enhancing the prairie underground display; and building a sky watch platform. We also support the staff with special memberships, and supplies; sponsor the hay ride, music and silent auction at Apple Harvest Festival; the annual Retzer photo contest; school scholarships to Retzer; and environmental issues forums. We sell compost bins, Retzer Nature Center caps, and perpetual calendars in the Retzer Gift Shop.

Our annual meeting is held in April with a free chili dinner and a speaker. In the past we have had interesting speakers like Melinda Myers and Scott Craven. All members are invited to the meeting.

To learn more about the Friends of Retzer Nature Center please visit us at <http://FriendsOfRetzer.org>.



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WAUKESHA COUNTY PARKS & LAND USE
S14 W28167 MADISON STREET
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